APPENDIX B - Derivation of Benefits

This appendix is divided into two parts: OSHA's methodology and PP&E's methodology. OSHA's methodology is based on the information given in its Preliminary Initial Regulatory Flexibility Analysis. The procedure used by PP&E to calculate the benefits is similar to that used by OSHA, but PP&E's methodology makes several arithmetic adjustments and calculates "lost output" differently. After adjustment, PP&E estimates that the benefits of the standard, is equal to $22,545/MSD. This value accounts for the following:

- The Temporary Total Disability benefits paid to a employee
- The Permanent Partial Disability benefits paid to an employee
- The wages or benefits lost by an employee during the temporary disability and as a result of permanent partial disability
- Medical benefits paid on behalf of an employee
- Administrative costs of workers compensation insurance company or pool
- Certain indirect costs incurred by the injured worker's company in the administration of workers compensation program.

Table B-1 shows benefits paid to workers by the State of Wisconsin in 1989-1990. It shows that average claim was $8,320 in 1989-1990. OSHA has assumed that the average claim is $8,000. It appears, therefore, that OSHA has made a reasonable estimate of the costs of average claim. The table also shows that about 33% of the benefits are what are termed "compromise benefits". These benefits represent 4% of all cases in which there were substantial disputes over long-term payments of medical, wage (earning capacity losses) and loss of limb benefits and legal settlements took place. The table also shows that PPD benefits were paid to 18.5% of the cases and accounted for 36% of all benefits paid. Thus, about 22.5% of the cases accounted for 69% of the benefits. If these benefits are excluded from the calculations, the average claim would be approximately $3,300.

However, OSHA's methodology assumes that, after the implementation of the Ergo program, there will be a proportional reduction in litigated cases and in PPD cases. OSHA's estimates of the average cost per claim ($8,000) and average benefit per MSD avoided ($22,545), are presumably derived from data on the number and costs of all injury and illness claims involving days away from work. These estimates for all injuries with days away from work have apparently been applied to the subcategory of Musculoskeletal Disorders. In doing so, OSHA has assumed that the average cost per *MSD* claim is the same as the average cost per claim for all types of injuries and illnesses. Furthermore, OSHA has apparently assumed that MSD injuries have the same structure as all other injuries with days away from work in terms of the duration and severity of the injury, medical benefits paid, probability of being litigated, and probability of being injured permanently.

There is no reason to believe that these assumptions are either correct or reasonable. OSHA has presented no data that support these critical assumptions. If anything, these assumptions are likely to be incorrect, especially if the rule results in new MSD claims. One thing that seems clear is that almost all of these new claims will come from those cases in which employees get injured but currently stay at work. These injuries may or may not be severe enough to require a long stay away from work even under the proposed MRP provisions. They do not result in permanent loss of earning capacity or loss of limbs, and they may not result in litigation. As a result, the structure of MSD claims after this standard is promulgated is likely to be substantially different than that of the MSD claims today and certainly different from the "average" illness or injury today.

Given these uncertainties (and for the purpose of comparing to OSHA's estimates) PP&E has structured a different methodology (see PP&E methodology). Using BLS data, PP&E has estimated the average number of days away from work for different types of MSDs and calculated the total benefits. PP&E's estimate results in a lower estimate of the benefit.

OSHA's higher estimate is a double edged sword. On the one hand, it is a net benefit if there is a reduction in the number of total MSD claims after the Ergo program is implemented. Employers should then experience reductions in worker's compensation premiums. On the other hand, it is a

cost increase if the number of MSD claims rises. If an employer experiences a net increase in MSD claims, his costs, in the form of increased worker compensation premiums and other costs are likely to increase by $22,545/MSD in conformance with OSHA's estimate.

OSHA's Methodology

Tables **B-2**, **B-3**, and **B-4** demonstrate OSHA's benefits calculations. The corrections for errors are included in *italics* next to OSHA's estimates and corrected methodology is included in *italics* next to OSHA's calculation descriptions in the footnotes.

Table B-1. 1989-1990 Lost - Time Injuries In Winconsin

Benefit Category	MEN			WOMEN			ALL CASES				
	Losses Per Injury	Total Losses	Number of Cases	Losses Per Injury	Total Losses	Number of Cases	Total Losses	Percent of All Losses	Total Cases	Claim/case	Percent of Total Cases
TTD Benefits Only											
8-10 days	$377	$2,147,895	5,697	$252	$599,760	2,380	$2,747,655	0.6%	8,077	$340	16.0%
11-14 days	$567	$2,358,342	4,159	$464	$837,675	1,805	$3,196,017	0.7%	5,965	$536	11.8%
2.1-3 weeks	$844	$3,929,101	4,655	$478	$977,988	2,046	$4,907,089	1.1%	6,701	$732	13.3%
3.1-4 weeks	$1,293	$3,391,108	2,623	$819	$984,984	1,203	$4,376,092	1.0%	3,825	$1,144	7.6%
4.1-6 weeks	$1,516	$5,158,443	3,403	$1,037	$1,653,669	1,595	$6,812,112	1.5%	4,997	$1,363	9.9%
6.1-8 weeks	$4,632	$10,313,920	2,227	$3,409	$3,524,906	1,034	$13,838,826	3.1%	3,261	$4,244	6.5%
8.1-12weeks	$8,261	$15,877,642	1,922	$14,426	$15,897,452	1,102	$31,775,094	7.2%	3,024	$10,508	6.0%
12.1-16 weeks	$28,438	$22,447,061	789	$21,625	$11,922,583	551	$34,369,644	7.7%	1,341	$25,636	2.7%
16.1 weeks	$32,044	$34,692,971	1,083	$21,335	$19,229,947	901	$53,922,918	12.2%	1,984	$27,179	3.9%
PPD Benefits	$16,256	$103,485,696	6,366	$21,035	$52,910,037	2,515	$156,395,733	35.3%	8,881	$17,609	17.6%
Compromise Benefits	$63,366	$95,091,244	1,501	$55,985	$47,624,573	851	$142,715,817	32.2%	2,351	$60,696	4.7%
Losses For All Claimes	$8,320	$286,413,227	34,425	$9,835	$157,196,083	15,983	$443,609,310	100.0%	50,408	$8,800	100.0%

Source: Table 7.1 in "Measuring Income Losses of Injured Workers: A Study of the Wisconsin System, by Leslie I. Boden and Monica Galizzi Workers Compensation Research Institute, Cambridge, MA; Nov. 1998.

TABLE B-2. OSHA's Estimates of the Value of Lost Output Associated with One Temporary Total Disability Caused by an MSD

Components of Lost Output	OSHA's Total	PP&E's Total
Total Cost per Claim (a)	$8,000	$8,000
Share of Payments Paid for Indemnity (b)	$4,920	$4,920
Share of Payments Paid for Medical Costs (c.)	$3,080	$3,080
Value of Temporary Total Disability Indemnity Payments (d)	$1,550	$1,550
Lost After-Tax Income Above the Value of Indemnity Payments (e)	$172	*$1,722*
Lost Value of Tax Payments (f)	$517	*$2,460*
Lost Value of Fringe Benefits (g)	$672	*$959*
Total (h)	**$2,910**	***$3,419***

(a) Argonaut Insurance Corporation.
(b) Estimated as 61.5 percent of total claim.
(c) Estimated as 38.5 percent of total claim.
(d) Calculated as temporary total disabilities as a share of all indemnity payments times the value of indemnity payments.
(e) Calculated based on estimate that the value of temporary total disability payments is 90 percent of the value of lost after-tax income. --- *Calculated using value of temporary total disability indemnity payment multiplied by (100/90), since the payments are estimated to replace 90% of the after-tax salary.*
(f) Calculated based on estimate that personal taxes are 30 percent of before-tax income.. --- *Calculated by multiplying after-tax income by (100/70), since after-tax income is equal to 70% of before-tax income.*
(g) Calculated based on estimate that fringe benefits are 39 percent of total income. --- *Calculated as 39% of before-tax income.*
(h) Calculated as before-tax income plus fringe benefits.

TABLE B-3. OSHA's Estimates of the Value of Lost Output Associated with One Permanent Partial Disability Caused by an MSD

Components of Lost Output	OSHA's Total	PP&E's Total
Value of Permanent Partial Disability Indemnity Payments (a)	$3,370	$3,370
Lost After-Tax Income Above the Value of Indemnity Payments (b)	$2,342	*$5,712*
Lost Value of Tax Payments (c)	$1,714	*$8,160*
Lost Value of Fringe Benefits (d)	$2,228	*$3,182*
Total (e)	**$9,654**	***$11,342***

(a) Calculated by multiplying the average value of a claim by 68.5 percent.
(b) Calculated based on estimate that the value of permanent partial disability payments is 59 percent of the value of lost after-tax income. --- *Calculated using value of permanent partial disability indemnity payment multiplied by (100/59), since the payments are estimated to replace 59% of after-tax income.*
(c) Calculated based on estimate that personal taxes are 30 percent of before-tax income. --- *Calculated by multiplying after-tax income by (100/70), since after-tax income is equal to 70% of before tax income.*
(d) Calculated based on estimate that fringe benefits are 39 percent of total income. --- *Calculated as 39% of before-tax income.*
(e) Calculated as before-tax income plus fringe benefits.

TABLE B-4. OSHA's Estimates of Annual Cost Savings Associated with the Prevention of One MSD-Related Workers' Compensation Claim

Type of Savings	OSHA's Total	PP&E's Total
Lost Output Associated with Temporary Total Disability (a)	$2,910	*$3,419*
Lost Output Associated with Permanent Partial Disability (b)	$9,654	*$11,342*
Medical Costs (c)	$3,080	$3,080
Insurance Administrative Costs (d)	$3,661	*$1,872*
Indirect Costs (e)	$5,538	*$2,832*
Total (f)	$24,842	*$22,545*

(a) Taken from Table B-1.
(b) Taken from Table B-2.
(c) Calculated by multiplying the number of preventable injuries and illnesses by the value of medical payments presented in Table B-1. --- *Estimated at 38.5% of total claim.*
(d) Calculated as 23.4 percent of the total value of workers' compensation claims. --- *Estimated as 23.4% of total value of workers' compensation claims. (.234 * 8,000)*
(e) Calculated as 35.4 percent of the total value of workers' compensation claims. --- *Estimated as 35.4% of value of workers' compensation claims. (.354 * 8,000)*
(f) Calculated as the sum of lost output, medical costs, administrative costs, and indirect costs.

PP&E Methodology

The revised methodology is based on the calculation of mean number of days away from work due to an MSD occurrence (resulting in days away from work) as shown in Table **B-5**. Table **B-6** exhibits the results of calculation of benefit, using the following basic steps:

1. Calculate the average number of hours missed due to an MSD injury or illness by multiplying the average number of days missed (from Table **B-5**) by eight hours per day.

2. Calculate the average compensation lost per employee missing work (due to a WMSD) by multiplying the average number of hours missed by the average hourly compensation rate for employees ($15.93).

3. Calculate the ratio of average compensation lost per employee missing work to OSHA's calculated lost output (based on an average total cost per MSD claim).

4. Apply the ratio to OSHA's methodology used to calculate the medical costs, insurance administrative costs, and indirect costs associated with a workers' compensation claim.

5. Sum the totals to obtain benefits associated with prevention of one MSD workers' compensation claim.

Table B-5. Mean Number of Days Away from Work Events Causing MSDs (1996)

	OVEREXERTION		REPETITIVE MOTION		B,C,C,R,T*	
Days	**# Cases**	**Total # Days**	**# Cases**	**Total # Days**	**# Cases**	**Total # Days**
1	69,899	69,899	5,509	5,509	10,265	10,265
2	63,149	126,298	5,799	11,598	11,437	22,874
4	117,888	471,552	9,541	38,164	18,077	72,308
8	75,965	607,720	8,577	68,616	11,936	95,488
15	33,468	502,020	5,516	82,733	4,677	70,155
16	33,468	535,488	5,516	88,248	4,677	74,832
25	17,558	438,950	4,198	104,938	2,185	54,625
26	17,558	456,508	4,198	109,135	2,185	56,810
50	97,640	4,882,000	24,944	1,247,200	14,036	701,800
Total	526,593	8,090,435	73,796	1,756,140	79,475	1,159,157
Mean		15.36		23.80		14.59
Median		6		17		5

Source: Bureau of Labor Statistics

Total All Cases: **679,864**
Total All Days: **11,005,732**
Mean Days Away: **16.19**

* Bending, climbing, crawling, reaching, twisting

Table B-6. Benefits Associated with the Prevention of One MSD-Related Employee Absence from Work, Using PPE Methodology

Type of Savings	Annual Cost Savings
Wage Rate (a)	$15.93
Cost of Wages (b)	$2,039.00
Medical Costs (c)	$428.00
Insurance Admin. Costs (d)	$260.00
Indirect Costs (e)	$393.00
Total Benefit (f)	**$3,120.00**

(a). Average hourly wage rate, provided by OSHA.

(b) Wages multiplied by mean length of time spent away from work due to an MSD occurrence.

Wage rate * 8 hours. * 16 days

Find the ratio of wages in OSHA' methodology and wages in the revised methodology

14,761/2,039 = 7.2

(c) Estimated as 38.5% of total claim = 0.385 x 8000/7.2

(d) Estimated as 23.4% of total claim = 0.234 x 8,000/7.2

(e) Estimated as 35.4% of total claim = 0.354 x 8,000/7.2

(f) Cost of wages + Medical costs + Insurance admin. Costs + Indirect costs